

19. $\lim_{x \rightarrow 0} \frac{|x|}{x}$ is
 (A) 0 (B) nonexistent (C) 1 (D) -1 (E) none of these

20. $\lim_{x \rightarrow \infty} x \sin \frac{1}{x}$ is
 (A) 0 (B) ∞ (C) nonexistent (D) -1 (E) 1

21. $\lim_{x \rightarrow \pi} \frac{\sin(\pi - x)}{\pi - x}$ is
 (A) 1 (B) 0 (C) ∞ (D) nonexistent (E) none of these

22. Let $f(x) = \begin{cases} \frac{x^2 - 1}{x - 1} & \text{if } x \neq 1 \\ 4 & \text{if } x = 1. \end{cases}$

Which of the following statements is (are) true?

- I. $\lim_{x \rightarrow 1} f(x)$ exists
 II. $f(1)$ exists
 III. f is continuous at $x = 1$

- (A) I only (B) II only (C) I and II
 (D) none of them (E) all of them

23. If $\begin{cases} f(x) = \frac{x^2 - x}{2x} & \text{for } x \neq 0, \\ f(0) = k, \end{cases}$
 and if f is continuous at $x = 0$, then $k =$

- (A) -1 (B) $-\frac{1}{2}$ (C) 0 (D) $\frac{1}{2}$ (E) 1

24. Suppose $\begin{cases} f(x) = \frac{3x(x-1)}{x^2-3x+2} & \text{for } x \neq 1, 2, \\ f(1) = -3, \\ f(2) = 4. \end{cases}$

Then $f(x)$ is continuous

- (A) except at $x = 1$ (B) except at $x = 2$ (C) except at $x = 1$ or 2
 (D) except at $x = 0, 1$, or 2 (E) at each real number

25. The graph of $f(x) = \frac{4}{x^2 - 1}$ has

- (A) one vertical asymptote, at $x = 1$
 (B) the y -axis as vertical asymptote
 (C) the x -axis as horizontal asymptote and $x = \pm 1$ as vertical asymptotes
 (D) two vertical asymptotes, at $x = \pm 1$, but no horizontal asymptote
 (E) no asymptote